

Name: \_\_\_\_\_

Class Period: \_\_\_\_\_

**Physics:**

**Problem Set – One Dimensional Kinematics**

**Conceptual Questions:**

1. What is the name, definition, and formula for the symbol  $\Delta$ ?
2. What motion results from a positive velocity and negative acceleration?
3. What motion results from a negative velocity and negative acceleration?
4. Consider, when you throw an object into the air and it reaches its highest point, what kind of velocity does it have (positive, negative, or zero)? What kind of acceleration does it have (positive, negative, or zero)?
5. Can an object have a changing speed if its velocity is constant?  
Yes or No (be ready to explain your reasoning)

**Mathematical Questions:**

6. An object moves 56.7 cm in a time of 1.4 seconds.
  - A. What is the average velocity of this object in m/s?
  - B. What is the average velocity of the object in miles per hour?
7. A horse canters away from his trainer in a straight line, moving 130 m away in 14.0 s. It then turns abruptly and gallops halfway back in 4.8 s. \*Assume that moving away from the trainer is in a positive direction.
  - A. What is the horse's displacement?
  - B. What is the horse's distance?
8. You are on your way to school, driving at a constant 20.0 m/s when you get stuck behind a super slow and smelly dump truck. You decide to move over to the next lane and pass. You accelerate at a uniform rate of 5.0 m/s<sup>2</sup>. How long will it take you to reach a velocity of 30.0 m/s?
9. A ball is dropped from rest from the top of the leaning tower of Pisa. The tower is 64 m high.
  - A. How far does the ball fall in the first 1.9 seconds of flight?
  - B. What is the velocity of the ball 2.9 s after it is released?

\*\*Questions 10 – 14 on back page

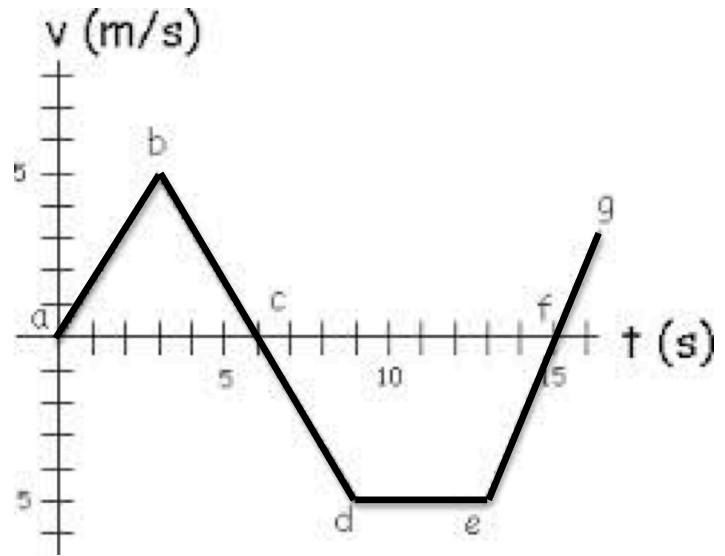
Use the Velocity vs. Time Graph of a moving object below to answer questions 10 – 13.

10. During which segment(s) is the velocity positive?

11. At which time(s) is the velocity zero?

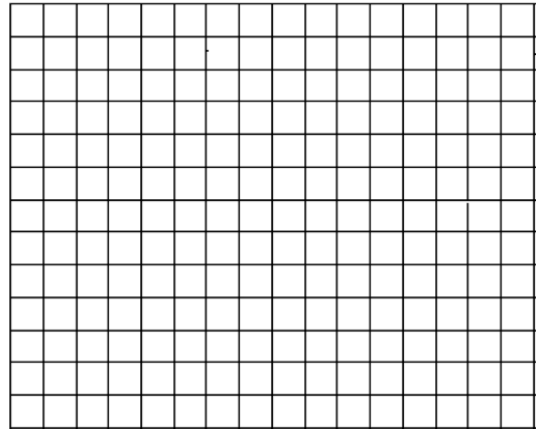
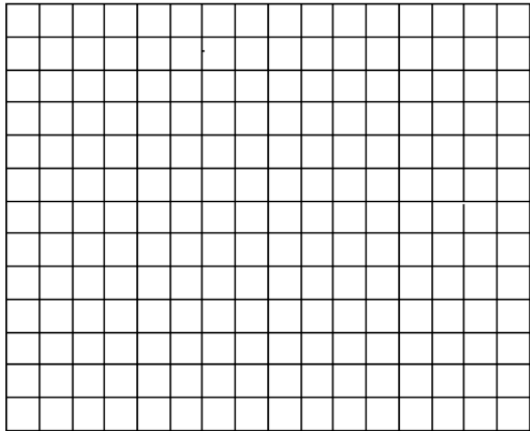
12. During which segment(s) is the acceleration negative?

13. What is the acceleration of the object from  $t = 3$  to  $t = 9$  s?



14. Sketch the position graph and then the velocity graph for the following scenario:

- The object begins at the origin and runs in a negative direction, 3 m in 1 second.
- The object stops for 2 seconds
- The object then runs 6 m in a positive direction in 2 seconds
- Finally, the object runs in a negative direction, 4 m, in another 2 seconds.



**Numerical Answers:**

- 6. A.)  $v = 0.41$  m/s  
B.)  $v = 0.91$  miles per hour
- 7. A.) displacement = 65 m  
B.) distance = 195 m
- 8.  $t = 2.0$  s
- 9. A.)  $y = -17.7$  m  
B.)  $v_f = -28.4$  m/s

- 10. Segments AB, BC, and FG
- 11. At  $t = 0$  s,  $t = 6$  s, and  $t = 15$  s
- 12. Segments BC and CD
- 13.  $a = -1.67$  m/s<sup>2</sup>